

REMARKS

I. Introduction

Claims 1 to 14 are pending in the present application. In view of the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

Applicants note with appreciation the acknowledgment of the claim for foreign priority and the indication that all certified copies of the priority documents have been received.

II. Rejection of Claims 1 to 5, 7, 10 and 11 Under 35 U.S.C. § 103(a)

Claims 1 to 5, 7, 10 and 11 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of International Published Patent Application No. WO 98/53229 ("Werner et al.") and U.S. Patent No. 5,351,971 ("Short"). Applicants respectfully submit that the combination of Werner et al. and Short does not render obvious claims 1 to 5, 7, 10 and 11 for the following reasons.

Claim 1 relates to a brush seal for sealing a rotor with respect to a stator. Claim 1 recites that the brush seal includes a bristle housing configured to be arranged on a first one of the rotor and the stator, the bristle housing including a cover plate, a supporting plate, a circumferential surface and two side surfaces. Claim 1 also recites that the brush seal includes bristles fastened in the bristle housing, the bristles including free ends oriented toward a second one of the rotor and the stator. Claim 1 further recites that the brush seal includes a first positioning arrangement provided on at least one of the circumferential section and at least one side surface, and a second positioning arrangement provided on one of the rotor, the stator and a fastening element. Claim 1 has been amended herein without prejudice to recite that the first positioning arrangement and the second positioning arrangement are configured to interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing.

Werner et al. purport to relate to a brush seal for sealing a rotor against a housing. According to Werner et al., the brush seal includes a front panel and a supporting plate attached to the housing wherein a number of bristles are disposed between the front panel and supporting plate. Werner et al. state that a seal housing that defines a fit surface is formed by cold joining the front panel and

supporting plate and that the front panel or the supporting plate include a beaded lip for firmly joining the front panel to the supporting plate.

Short purports to relate to a brush seal device for sealing a high pressure area from a low pressure area. Short states that the brush seal device comprises an annular sideplate having a first side facing the high pressure area and a second side opposite the first side, an annular backplate having a first side facing the low pressure area and a second side opposite the first side, and a plurality of bristles between the second side of the sideplate and the second side of the backplate. According to Short, the backplate is moveable in a radial direction relative to the annular sideplate and the plurality of bristles extend inwardly from an outer peripheral edge of the sideplate. Short further states that the brush seal device further comprises a retaining washer between the first side of the backplate and the low pressure area, wherein the retaining washer includes a cavity proximate the first side of the backplate, the cavity having an adjustable pressure therein.

With respect to claims 1 to 5, 7, 10 and 11, the Office Action contends that "Werner discloses a brush seal comprising a bristle housing (2) including a cover plate (3) and a supporting plate (4), bristles (5), circumferential surface (9), two side surfaces (vertical portions of 3 and 4), a first positioning arrangement on a side surface (portion of 4 abutting 2), and a second positioning arrangement on a rotor (portion of 2 abutting 4) [and that] the cover plate includes a flanged section (7) with an undercut (at 6) and inner surface (at 8) and the supporting plate includes an axial section (horizontal portion of 4) [and that] the cover plate and supporting plate are formed by non-cutting shaping and deep drawing (col. 1, line 66)." Office Action at page 2. The Office Action admits that "Werner fails to disclose a positive-locking arrangement between the first positioning arrangement and the second positioning element." Office Action at page 3. The Office Action also admits that "Werner fails to disclose this positive locking manner for the purpose of preventing relative rotation and positioning the first element relative to the second element to prevent incorrect mounting." Office Action at p. 3. However, the Office Action contends that "Short teaches a positive locking manner (100) associated with a first positioning arrangement (90) and a second positioning arrangement (40) defined in a recess (11) substantially as claimed for the purpose of preventing relative rotation between the first positioning arrangement and the second positioning arrangement (col. 3, lines 58-65) [and that the] structure of Short inherently provides positioning the first

element relative to the second element relative to the second element to prevent incorrect mounting.” Office Action at page 3. The Office Action concludes that “[i]t would have been obvious to one having ordinary skill in the art at the time of applicant’s invention to modify Werner’s brush seal to include positive locking such that it prevents relative rotation between the two positioning arrangements to prevent the backplate from rotating relative to the housing and to prevent incorrect mounting.” Office Action at p. 3.

Applicants respectfully submit that the combination of Werner et al. and Short does not render obvious claim 1 for at least the reason that the combination of Werner et al. and Short fails to disclose, or even suggest, all of the limitations recited in claim 1. For example, the combination of Werner et al. and Short fails to disclose, or even suggest, that the first positioning arrangement and the second positioning arrangement are configured to interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing, as recited in amended claim 1. With respect to Werner et al., the Office Action identifies beaded lip 7 and circumferential surface 9 as first and second positioning elements, respectively. In addition, with respect to Short, the Office Action identifies squeeze plate 90 as a first positioning element and back plate 40, which has a recess 110 into which an anti-rotation pin 100 is inserted, as a second positioning element. However, neither of these arrangements describes first and second positioning elements that interact with each other, let alone interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the bristle housing. For instance, in Werner et al., beaded lip 7 does not interact with circumferential surface 9, and thus these elements of Werner et al. can not be considered as interacting with each other to provide the combined benefit of positive locking and definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the bristle housing. In Short, the insertion of the anti-rotation pin 100 into the recess 110 of the squeeze plate 90 operates to prevent the rotation of the back plate 40 relative to the squeeze plate 90. However, the insertion of the anti-rotation pin 100 into the recess 110 of the squeeze plate 90 does not operate to prevent the rotation of the bristle housing relative to the brush seal device 10. Rather, Short states that “the sideplate 30 is preferably fixed to the machine

housing.” Column 2, lines 50 to 51 (emphasis added). Short further states that “the bristles are sandwiched between a squeeze plate 90, the squeeze plate 90 ... preferably fixed to the machine housing.” Column 2, line 65 to column 3, line 1 (emphasis added). Since the bristle housing of Short is fixed to the device, there is no requirement, and thus no disclosure or suggestion, of any positioning arrangement to prevent relative rotation of the entire bristle housing. At most, Short describes an arrangement to prevent rotation of one portion of a bristle housing, e.g., backplate 40, relative to another portion of the bristle housing, e.g., squeeze plate 90. Short also does not describe any other component that could be considered a first positioning arrangement that interacts with the backplate 40 , recess 110 and anti-rotation pin 100 that the Office Action identifies as being a second positioning arrangement. Thus, Short does not describe any two positioning arrangements that interact with each other to provide the combined benefit of positive locking and definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing.

To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). Since the combination of Werner et al. and Short does not disclose, or even suggest, all of the limitations of amended claim 1 as more fully set forth above, it is respectfully submitted that the combination of Werner et al. and Short does not render obvious amended claim 1.

Therefore, Applicants respectfully submit that the combination of Werner et al. and Short does not render obvious amended claim 1. Withdrawal of this rejection is therefore respectfully requested.

In addition, Applicants respectfully submit that claims 3 to 5, 10, 11 and 14, which ultimately depend from claim 1 and therefore include all of the limitations of claim 1 as amended, are also not rendered unpatentable by the

combination of Werner et al. and Short for at least the same reasons given above in support of the patentability of amended claim 1. In re Fine, supra (any dependent claim depending from a non-obvious independent claim is non-obvious).

III. Rejection of Claim 14 Under 35 U.S.C. § 103(a)

Claim 14 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Werner et al., Short, and U.S. Patent No. 5,066,025 ("Hanrahan"). It is respectfully submitted that the combination of Werner et al., Short and Hanrahan does not render obvious claim 14 for the following reasons.

Hanrahan purports to relate to a support structure that includes a recess which accepts a short plate of a brush seal but will not accept a long plate of the brush seal. Furthermore, Hanrahan purports to describe a retaining ring groove that accepts the retaining ring only if the seal is installed in the proper direction. Hanrahan also purports that, in accordance with this arrangement, reverse installation of the brush seal is precluded without special machining of the brush seal.

As more fully set forth above, the combination of Werner et al. and Short does not disclose, or even suggest, all of the limitations of amended claim 1. Claim 14 depends from claim 1 and therefore includes all of the limitations of claim 1. Hanrahan is not relied on to disclose or suggest, and does not disclose or suggest, those features of amended claim 1 not disclosed or suggested by the combination of Werner et al. and Short. For instance, Hanrahan is not relied on to disclose or suggest, and does not disclose or suggest, that the first positioning arrangement and the second positioning arrangement are configured to interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing, which as more fully described above, is not disclosed or suggested by the combination of Werner et al. and Short. Rather, the Office Action identifies lip 30 and recess 32 of Hanrahan as a first positioning element and static structure 12 as a second positioning element. However, lip 30 and recess 32 do not interact with static structure 12, and thus Hanrahan does not disclose or suggest a first positioning arrangement and a second positioning arrangement that are configured to interact with each other. Furthermore, none of these elements interact with each other to provide the combined benefit of positive locking and definite positioning of

the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing. Rather, the lip 30 and the recess 32 of Short extend around the circumference of the sealing device, and thus they do not prevent relative rotation. Since claim 14 depends from independent claim 1, and since Hanrahan simply does not cure the critical deficiencies of the combination of Werner et al. and Short, it is respectfully submitted that claim 14 is allowable for at least the same reasons that claim 1 is allowable. In re Fine, supra.

IV. Rejection of Claims 6, 8 and 9 Under 35 U.S.C. § 103(a)

Claims 6, 8 and 9 were rejected under 35 U.S.C. § 103(a) as unpatentable over Werner et al. and Short, and further in view of U.S. Patent No. 6,106,190 ("Nakamura et al."). Office Action at p. 3. It is respectfully submitted that the combination of Werner et al., Short and Nakamura et al. does not render obvious claims 6, 8 and 9 for the following reasons.

Claim 6 relates to a brush seal for sealing a rotor with respect to a stator. Claim 6 recites that the brush seal includes a bristle housing configured to be arranged on a first one of the rotor and the stator, the bristle housing including a cover plate, a supporting plate, a circumferential surface and two side surfaces. Claim 6 also recites that the brush seal includes bristles fastened in the bristle housing, the bristles including free ends oriented toward a second one of the rotor and the stator. Claim 6 further recites that the brush seal includes a first positioning arrangement provided on at least one of the circumferential section and at least one side surface, and a second positioning arrangement provided on one of the rotor, the stator and a fastening element. Claim 6 has been amended herein without prejudice to recite that the first positioning arrangement and the second positioning arrangement are configured to interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing. Claim 6 also recites that the first positioning arrangement includes at least one spot weld that projects beyond the circumferential surface, the second positioning arrangement including a recess formed in one of the stator and the rotor, the at least one spot weld being engageable in the recess.

Claim 9 relates to a brush seal for sealing a rotor with respect to a stator. Claim 9 recites that the brush seal includes a bristle housing configured to be

arranged on a first one of the rotor and the stator, the bristle housing including a cover plate, a supporting plate, a circumferential surface and two side surfaces. Claim 9 also recites that the brush seal includes bristles fastened in the bristle housing, the bristles including free ends oriented toward a second one of the rotor and the stator. Claim 9 further recites that the brush seal includes a first positioning arrangement provided on at least one of the circumferential section and at least one side surface, and a second positioning arrangement provided on one of the rotor, the stator and a fastening element. Claim 9 has been amended herein without prejudice to recite that the first positioning arrangement and the second positioning arrangement are configured to interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing. Claim 9 also recites that the first positioning arrangement includes at least one integral projection that projects beyond at least one side surface, wherein the projection is one of lenticular and conical, the second positioning arrangement including a recess formed in one of the stator, the rotor and the fastening element, the at least one integral projection being engageable in the recess.

Nakamura et al. purport to relate to a marine fender with a structure for fixing a pad to a fender frame, in which the pad has at least one concavity formed in a front surface thereof, and a pad hole piercing the pad from a bottom of the concavity. Nakamura et al. state that a bolt with a head is inserted from a front side of the pad through the pad and fender holes, and a nut is disposed at a rear side of the fender frame to engage the bolt to thereby fix the pad to the fender frame. According to Nakamura et al., a washer is interposed between the head of the bolt and the bottom of the concavity. In case the bolt is attached to the fender frame, the nut is disposed in the concavity of the pad to engage the bolt, and the washer is interposed between the nut and the bottom of the concavity. Nakamura et al. purport that, in either case, the washer is disposed in the concavity such that a rim of the washer engages an inner periphery of the concavity to prevent rotation with each other, and the head of the bolt or nut is joined to the washer.

Applicants respectfully submit that the combination of Werner et al., Short and Nakamura et al. does not render obvious amended claims 6 and 9 for at least the reason that the combination of Werner et al., Short and Nakamura et al. fails to disclose, or even suggest, all of the limitations recited in amended claims 6

and 9. For example, the combination of Werner et al., Short and Nakamura et al. fails to disclose, or even suggest, that the first positioning arrangement and the second positioning arrangement are configured to interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing, as recited in amended claims 6 and 9. As more fully set forth above, neither Werner et al. nor Short disclose or suggest such an arrangement. Furthermore, Nakamura et al. also do not describe, or even suggest, first and second positioning elements that interact with each other, let alone interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the bristle housing.

Therefore, Applicants respectfully submit that the combination of Werner et al., Short and Nakamura et al. does not render obvious claims 6 and 9 as amended. Withdrawal of the rejection of these claims is therefore respectfully requested.

In addition, Applicants respectfully submit that claim 8, which depends from claim 1 and therefore includes all of the limitations of claim 1, is also not rendered unpatentable by the combination of Werner et al., Short and Nakamura et al. Since claim 8 depends from independent claim 1, and since Nakamura et al. simply do not cure the critical deficiencies of Werner et al. and Short, as more fully described above, it is respectfully submitted that claim 8 is allowable for at least the same reasons that claim 1 is allowable. In re Fine, supra.

V. Rejection of Claims 12 and 13 Under 35 U.S.C. § 103(a)

Claim 12 and 13 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Werner et al., Short, and U.S. Patent No. 5,066,024 ("Reisinger et al."). It is respectfully submitted that the combination of Werner et al., Short and Reisinger et al. does not render obvious claims 12 and 13 for the following reasons.

Reisinger et al. purport to relate to a brush-type seal that has a wire bundle which is bent in a U-shape and is surrounded by a radially inward slotted ring shaped tube and by a housing consisting of two connected support rings. According to Reisinger et al., application and maintenance of clamping forces is possible and is provided for the ring shaped tube through the support rings, and attachments are

provided on one supporting for fastening at a housing. Reisinger et al. state that the support rings are connected by welding at a welding joint which is spaced from the slotted tube which directly contacts the wire bundle.

Claims 12 and 13 ultimately depend from claim 1 and therefore include all of the limitations of claim 1. Since claims 12 and 13 depend from independent claim 1, and since Reisinger et al. simply do not cure the critical deficiencies of Werner et al. and Short, as more fully described above, it is respectfully submitted that claim 12 and 13 is allowable for at least the same reasons that claim 1 is allowable. In re Fine, supra. Withdrawal of this rejection is therefore respectfully requested.

As more fully set forth above, the combination of Werner et al. and Short does not disclose, or even suggest, all of the limitations of amended claim 1. Claims 12 and 13 depend from claim 1 and therefore include all of the limitations of claim 1. Reisinger et al. are not relied on to disclose or suggest, and do not disclose or suggest, those features of amended claim 1 not disclosed or suggested by the combination of Werner et al. and Short. For instance, Reisinger et al. are not relied on to disclose or suggest, and do not disclose or suggest, that the first positioning arrangement and the second positioning arrangement are configured to interact with each other in a positive-locking manner and to provide definite positioning of the bristle housing so as to prevent relative rotation and incorrect mounting of the entire bristle housing, which as more fully described above, is not disclosed or suggested by the combination of Werner et al. and Short. Rather, Reisinger et al. describe "[a] brush seal 1a [that] is fixed in a casing 16 by means of securing rings." Column 3, lines 14 to 15. However, Reisinger et al. do not describe any arrangement for preventing the relative rotation of the casing 16 and the securing rings 17. Since claims 12 and 13 depend from independent claim 1, and since Reisinger et al. simply do not cure the critical deficiencies of the combination of Werner et al. and Short, it is respectfully submitted that claims 12 and 13 are allowable for at least the same reasons that claim 1 is allowable. In re Fine, supra.

VI. Conclusion

It is therefore respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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Dated:

August 8, 2003

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